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Water Woes

Greg Tammen
Kansas State University

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Water woes

Researchers find
vast U.S. aquifer being tapped out



Kansas is one of the nation’s leading agricultural states. But its future success may have more to do with what happens under the fields than in them, as an important natural irrigation source is nearing 70 percent depletion.

An interdisciplinary team of researchers at Kansas State University recently published a study that predicted a future timeline for the depletion and natural recharge rate of the Ogallala Aquifer, as well as its effects on future crop production and cattle in Kansas. The Ogallala Aquifer spans eight states and produces roughly 30 percent of all of the irrigation for agriculture in the U.S.

“When you look at a topic like the Ogallala, it’s about more than just the groundwater,” said David Steward, professor of civil engineering at Kansas State University. “The groundwater in Kansas is not blue, it’s green, meaning that there are a lot of economics tied up in it.”

Using past and present measurements of groundwater levels, Steward and colleagues developed a statistical model that projected groundwater declines in western Kansas for the next 100 years and the effect they will have on cattle and crops — key components in the state’s agricultural economy.

They found that if current irrigation trends continue, 69 percent of the groundwater stored in the Ogallala Aquifer will be depleted in 50 years. Immediately reducing water use could extend the aquifer’s lifetime and increase net agricultural production through the year 2110.

Similarly, their model estimated that 3 percent of the aquifer’s water had been

used by 1960. By 2010, 30 percent had been tapped. An additional 39 percent is projected to be used by 2060 — resulting in the 69 percent loss given current use. Once depleted, the aquifer could take an average of 500-1,300 years to completely refill.

“My colleagues and I wrote the paper for the family farmer who wants to pass his land on to his grandchildren knowing that they will have the same opportunities that farmers do today,” Steward said.

But the study has resonated with a broader audience. It was covered by The Wall Street Journal, NBC News, Fox News, NPR, the Discovery Channel, USA Today, Scientific American and The Economist magazine among others, and has generated numerous editorials and letters to the editor in newspapers.

Similarly, it attracted the attention of Kansas Gov. Sam Brownback, who cited the study’s findings at his Council of Economic Advisers, a consortium of business executives from across the state.

“One of the key issues for this region — for the state — is water,” Brownback said at the August meeting. “[The Ogallala] is an enormous gift that has been given to this region of the world. But it is finite.”

Steward said complete depletion of the Ogallala Aquifer doesn’t have to be in Kansas’ future, however.

Water use efficiencies have increased about 2 percent a year in Kansas, resulting in about 2 percent more crop for each unit of water. While water use will peak around 2025, the current trend of increased efficiencies will result in corn and cattle production peaking around 2040. What happens next largely depends on decisions in the near future.

“At some point we will need to use less water,” Steward said. “We’re on this trajectory, but there are still things we can do to change it. That path and the final outcome from it are not preordained. As a society, we have an opportunity to make some important decisions that will have consequences for future generations.”

The study also was conducted by Kansas State University’s Michael Apley, professor of clinical sciences and an expert in cattle production; Stephen Welch, professor of agronomy who helped with a statistics method called bootstrapping; and Scott Staggenborg, adjunct professor in agronomy who helped with agricultural production methods.

It was published in the scientific journal Proceedings of the National Academy of Sciences, or PNAS. It took four years to complete and was funded by the National Science Foundation, the U.S. Department of Agriculture and the university’s Rural Transportation Institute.

By Greg Tammen, Communications and Marketing

OGALLALA AQUIFER



By 1960, **3%** of groundwater had been used.

By 2010, **30%** of groundwater had been used.

By 2060, **69%** of the groundwater will be depleted.

Once DEPLETED, the aquifer could take **500-1,300** years to completely refill.

The Ogallala Aquifer supplies nearly **30%** of the total irrigation for U.S. agriculture.

